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10/531,780	04/19/2005	Thomas Schafer	ELI2-22773/A/PCT	6057
334	7590	01/07/2010	EXAMINER	
Ciba Corporation Patent Department 540 White Plains Road P.O. Box 2005 Tarrytown, NY 10591			YAMNITZKY, MARIE ROSE	
			ART UNIT	PAPER NUMBER
			1794	
			NOTIFICATION DATE	DELIVERY MODE
			01/07/2010	ELECTRONIC

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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# Office Action Summary

**Application No.**

10/531,780

**Applicant(s)**

SCHAFFER ET AL.

**Examiner**

Marie R. Yamnitzky

**Art Unit**

1794

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 01 September 2009.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 46-62 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 46-62 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SI/22)
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date: \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_
- Paper No(s)/Mail Date: \_\_\_\_\_

1. This Office action is in response to applicant's amendment filed September 01, 2009, which cancels claims 26-45, adds claims 46-62, and provides a substitute specification and abstract.

Claims 46-62 are pending.

2. The objection to the disclosure for informalities is overcome by the substitute specification filed September 01, 2009.

3. All claim objections and rejections set forth in the previous Office action (notification date: June 01, 2009) are rendered moot by claim cancellation.

The rejections under 35 U.S.C. 102(b) that were set forth in the previous Office action are not applicable against any of the present claims.

The provisional obviousness-type double patenting rejection over claims of copending Application No. 11/587,691 is also not applicable against any of the present claims in view of the amendment filed September 16, 2009 in the '691 application.

4. Claims 46-62 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

In claims 46 and 55, the section beginning "wherein one of the groups" includes a semicolon after "-NR<sup>5</sup>R<sup>6</sup>". It is not clear if everything after the semicolon is a possibility for one

of the W or Y groups (in which case, the examiner suggests inserting --or-- before “-NR<sup>5</sup>R<sup>6</sup>”), or if everything after the semicolon is a possible substituent for “phenyl...substituted by” (in which case, the examiner suggests changing the semicolon to a comma).

In claims 46 and 55, the section beginning “wherein R<sup>5</sup> and R<sup>6</sup>” includes “substituted by C<sub>1</sub>-C<sub>18</sub> alkyl, C<sub>1</sub>-C<sub>18</sub> alkyl;” It is not clear if the second occurrence of “C<sub>1</sub>-C<sub>18</sub> alkyl” is a possibility for R<sup>5</sup> and R<sup>6</sup> (in which case, the examiner suggests changing the comma after the first occurrence of “C<sub>1</sub>-C<sub>18</sub> alkyl” to a semicolon), or a duplicate recitation of substituents for the C<sub>6</sub>-C<sub>18</sub> aryl (in which case, the duplicate recitation should be deleted).

The definitions of the W, Y and X variables in claims 47 and 56 do not appear to be fully consistent with the definitions as set forth in the independent claims. Lines 2 and 5 of claims 47 and 56 include a semicolon after “-OR<sup>5</sup>”. It is not clear if what follows the semicolon are distinct possibilities for the variables, or if what follows the semicolon are possible substituents for “phenyl...substituted by”.

Similarly, the use of a semicolon after each occurrence of “-OR<sup>5</sup>” in claims 48, 50-53, 57 and 59-62 appears to provide definitions that are inconsistent with the “one of the groups” and/or “the remaining groups” sections as set forth in the independent claims.

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claims 46-62 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sakon et al. (US 5,077,142) in view of Schomaker et al. in *J. Org. Chem.*, Vol. 66, pp. 7125-7128 (2001).

Sakon et al. disclose compounds of the general formula  $(B')_m-(Ar)_n$  for use in an organic compound layer of an electroluminescent device comprising one or more organic compound layers sandwiched between an anode and a cathode. B' may be pyrimidine and Ar may be benzene, biphenyl, methoxybenzene or naphthalene. See, for example, column 2, line 21-c. 6, l. 45. Pyrimidine compounds having three aryl group substituents as within the scope of formula (I) as defined in present independent claims 46 and 55 are within the scope of Sakon's general formula.

Sakon et al. provide a specific example of a pyrimidine compound having four phenyl groups as substituents (see the compound represented by formula 146 in columns 67-68). Sakon's compound of formula 146 is a compound of Sakon's general formula wherein B' is pyrimidine, Ar is benzene, m is 1 and n is 4. Pyrimidine compounds within the scope of formula (I) having three aryl group substituents per the present claims would have been obvious to one of ordinary skill in the art at the time of the invention given Sakon's definitions of B', Ar, m and n, Sakon's compound of formula 146 and Sakon's compounds such as those of formulae 9 and 10 in columns 15-16 and formula 148 in columns 67-68. Sakon's compound of formula 10 is a compound in which B' is a benzene ring, m is 1, n is 4, and the four Ar groups are in the same pattern on the benzene ring as on the pyrimidine ring in the compound of formula 146. Sakon's compound of formula 9 is a compound in which B' is a benzene ring, m is 1, n is 3, and the three Ar groups are in the same pattern as provided by W, X and Y in present formula (I). Sakon's

compound of formula 148 is a compound in which B' is a triazine ring, m is 1, n is 3, and the three Ar groups are in the same pattern as provided by W, X and Y in present formula (I). It would have been an obvious modification to one of ordinary skill in the art at the time of the invention to make pyrimidine compounds of Sakon's general formula in which B' is pyrimidine, m is 1, and n is 3. There are only three possible substitution patterns for such a substituted pyrimidine, and one of ordinary skill in the art at the time of the invention would have reasonably expected that a 2,4,6-Ar-substituted pyrimidine would be light-emissive and could be used for Sakon's purposes. Further, one of ordinary skill in the art at the time of the present invention, having knowledge of Sakon's disclosure, and having knowledge of the teachings of Schomaker et al. regarding methods of providing 2,4,6-aryl-substituted pyrimidines, would have been able to make 2,4,6-Ar-substituted pyrimidines within Sakon's general formula. A 2,4,6-Ar-substituted pyrimidine within the scope of Sakon's general formula wherein Ar is biphenyl (one of the four possibilities for Ar as recited at c. 2, l. 63-64 of Sakon's patent) is within the scope of present formula (I) as defined in claims 46 and 55, and also meet the limitations of the compound as required for the device of claims 47-54 and the compound as further defined by claims 56-62.

With respect to the device structure recited in claim 46, and the limitations recited in claim 54, Sakon's electroluminescent devices have at least a luminescent layer sandwiched between an anode and a cathode. The luminescent layer comprises a compound of Sakon's general formula  $(B')_m-(Ar)_n$ . The device may further comprise a separate hole transporting layer between the anode and the luminescent layer, and/or a separate electron transporting layer between the cathode and the luminescent layer. The luminescent layer itself may also function

as an electron transporting layer and/or hole transporting layer. For example, see Fig. 1, Fig. 2, Fig. 3, column 2, lines 21-40, c. 77, l. 18-47, and c. 78, l. 52-c. 79, l. 30.

7. Claims 46-62 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sakon et al. (US 5,077,142) in view of Schomaker et al. in *J. Org. Chem.*, Vol. 66, pp. 7125-7128 (2001), as applied to claims 46-62 above, and further in view of Fink et al. (US 6,352,791 B1).

Sakon et al. suggest pyrimidine compounds substituted with three phenyl groups wherein the phenyl group may be unsubstituted (when Ar is benzene) or substituted with a phenyl group (when Ar is biphenyl). Schomaker et al. describe a method by which aryl groups may be substituted on a pyrimidine ring at the 2, 4 and 6 positions.

Sakon et al. do not teach a terphenyl group for Ar as necessary to provide substituted pyrimidine compounds per applicant's originally elected species and within the scope of present claims 46-62 (e.g. as when the compound is a compound of formula IV as defined in claims 53 and 62 wherein each of  $W^3$ ,  $X^3$  and  $Y^3$  is biphenyl and all other variables are H). The closest compound within the scope of Sakon's general formula is a compound wherein B' is pyrimidine, m is 1, n is 3, Ar is biphenyl, and the Ar groups are at positions 2, 4 and 6 of the pyrimidine ring.

Fink et al. disclose compounds for use in an electroluminescent device wherein the compounds have a triazine ring substituted with aromatic substituents. Fink's compounds of formula (I) as shown in column 2 encompass compounds of Sakon's general formula wherein B' is triazine, m is 1, n is 3 and Ar is phenyl (benzene) or biphenyl (see the first and fifth formulae set forth for the R variables in col. 2 of the Fink patent). Fink et al. also teach that the three

aromatic substituents on the triazine ring may be terphenyl groups (see the fourth formula set forth for the R variables in col. 2 of the Fink patent). Given Sakon's disclosure of aryl-substituted triazine and pyrimidine compounds for use in an electroluminescent device, and given Fink's disclosure of phenyl, biphenyl or terphenyl as suitable substituents to provide aryl-substituted triazine compounds for use in an electroluminescent device, it would have been an obvious modification to one of ordinary skill in the art at the time of the invention to make compounds similar to those of Sakon's general formula having pyrimidine for B', m is 1, n is 3, but having terphenyl, instead of phenyl (benzene) or biphenyl, for Ar. One of ordinary skill in the art would have reasonably expected that terphenyl-substituted compounds could be used for the same purpose as phenyl- or biphenyl-substituted compounds. Sakon's compounds are taught for use in a luminescent layer which may also function as an electron transporting layer, and Fink's compounds are taught for use in an electron-conducting layer that may also function as a light-emitting layer. Further, one of ordinary skill in the art at the time of the invention would have recognized that Schomaker's method could be modified to provide terphenyl groups, instead of phenyl groups, at the 2, 4 and 6 positions of pyrimidine.

8. Applicant's arguments filed September 01, 2009 have been fully considered but they are not persuasive with respect to the rejections under 35 U.S.C. 103(a).

The data set forth in the Rule 132 Declaration filed March 09, 2009 have been reconsidered. It is the examiner's position that the data do not demonstrate unexpectedly superior results commensurate in scope with the claims.



The data provide a comparison between devices in which pyrimidine compounds and similar triazine compounds are utilized in an electron transport layer that is distinct/separate from the light emitting layer, and the light emitting layer comprises an iridium complex as the emitter. In contrast, the pyrimidine compound of formula I may be present in the light emitting layer of the device per present claims 46-53, and per present claim 54 given that the language of the present claims does not explicitly restrict layer c) from also providing the functions of b) and/or d). The device claims do not limit the composition of the layer(s) other than that at least one layer must comprise a compound of formula I. It was known in the art at the time of the invention that a single layer may provide multiple functions, and the applied prior art of Sakon et al. and Fink et al. each teach that a single layer may have the functions of a light emitting layer and an electron transporting layer. Even if the present device claims were to require the light emitting layer and the electron transporting layer to be distinct/separate layers, the data set forth in the Rule 132 Declaration do not demonstrate that the pyrimidine compounds provide unexpected results compared to the similar triazine compounds when used for the purpose taught by Sakon et al.

With respect to present compound claims 55-62, it is the examiner's position that compounds within the scope of the claims would have been obvious to one of ordinary skill in the art at the time of the invention given the teachings of the prior art. While certain pyrimidine compounds may provide unexpected results compared to similar triazine compounds when used in a particular multilayered electroluminescent device structure, a showing of unexpected results when the compound is used in a particular device structure does not necessarily render the

compounds patentable. The prior art suggests pyrimidine compounds within the scope of the present compound claims, and suggests the pyrimidine compounds for uses other than as used in the device structures described in the Rule 132 Declaration filed March 09, 2009.

9. Miscellaneous:

In line 7 of claim 46, "comprise" should read --comprises--.

In claims 46-48, 50-53, 55-57 and 59-62, each occurrence of "pyridyl" should read --pyridyl--.

10. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Art Unit: 1794

11. Any inquiry concerning this communication should be directed to Marie R. Yamnitzky at telephone number (571) 272-1531. The examiner works a flexible schedule but can generally be reached at this number from 7:00 a.m. to 3:30 p.m. Monday and Wednesday-Friday.

The current fax number for all official faxes is (571) 273-8300. (Unofficial faxes to be sent directly to examiner Yamnitzky can be sent to (571) 273-1531.)

/Marie R. Yamnitzky/  
Primary Examiner, Art Unit 1794

MRY  
December 31, 2009